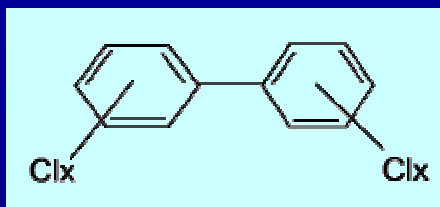


# -PCB Informational Meeting - Monitoring for PCB TMDL Development on the Elizabeth River



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November 5, 2009

# Meeting Overview - PCBs

- Background
  - Why important?
- Legacy Pollutant
- Spring 2009 Study
- TMDL Development/  
Challenges
- PCB Point Source  
Guidance



# VA Regulatory Criteria Total PCBs

Consumption  
Advisories  
Fish Tissue  
(ppb)

50

Water Quality  
Criterion  
(ppb)

(Awaiting final approval from EPA)

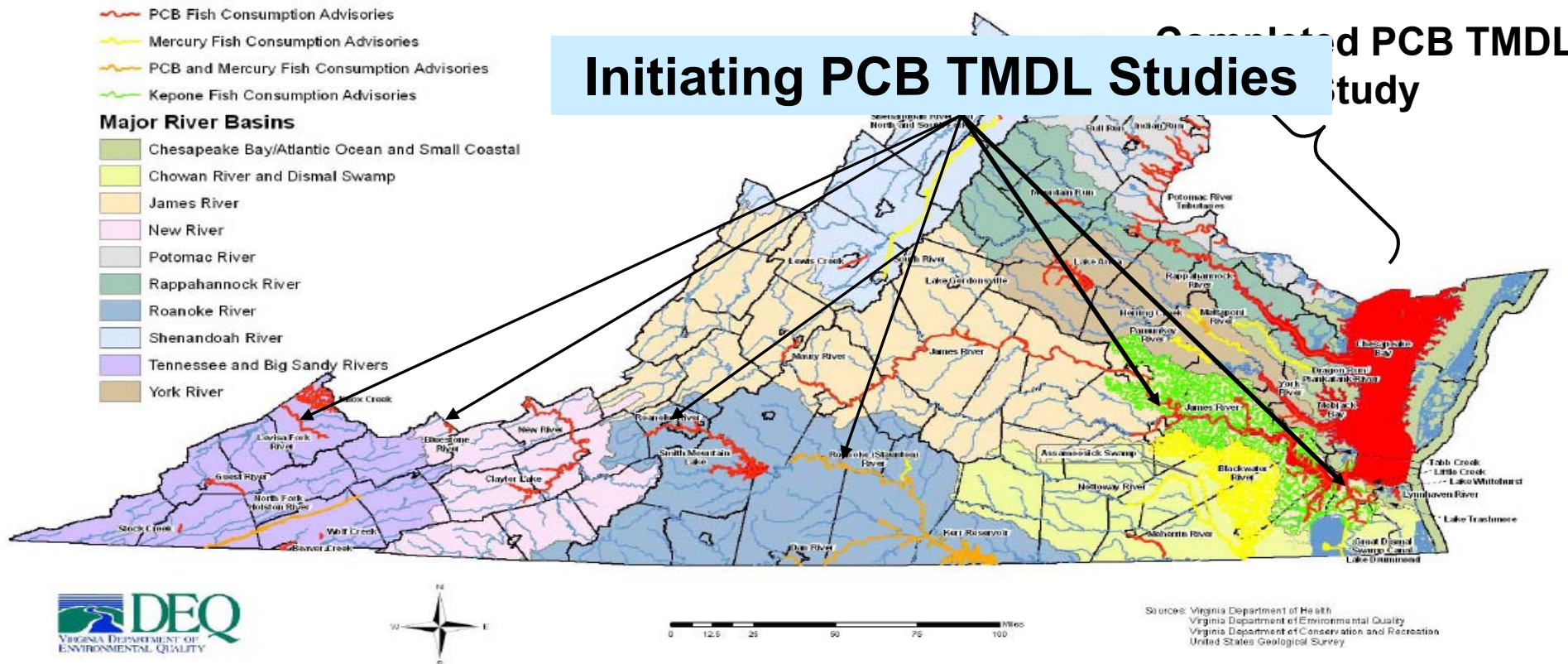
0.00064

—WQC represents conc. in water column where exposure of fish to PCBs should minimize bioaccumulation such that the fish tissue conc. will be protective of human consumption

# Problem Identification

## - Fish Consumption Advisories -

### Waters Under VDH Fish Consumption Advisories Identified in 2008 305(b)/303(d) Water Quality Integrated Report



Revised November 26, 2007

# Elizabeth River Fish Consumption Advisory (VDH)

Willoughby Bay and the Elizabeth River system (Western Br., Eastern Br., Southern Br., and Lafayette River) and tidal tributaries St. Julian Creek, Deep Creek, and Broad Creek

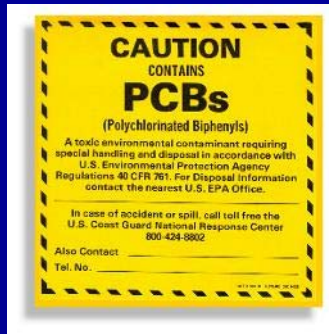
Fish Species	Advisory
Gizzard Shad, Carp, Blue Catfish & Flathead Catfish $\geq$ 32 inches	Do Not Eat
Blue Catfish & Flathead Catfish < 32 inches, Channel Catfish, White Catfish, Largemouth Bass, Bluegill Sunfish, <b>American Eel</b> , Quilback Carpsucker, Smallmouth Bass, Creek Chub, Yellow Bullhead Catfish, <b>White Perch</b> , <b>Blueback Herring</b> , <b>Striped Bass</b> , Hickory Shad, Croaker, Spot, Bluefish	No more than two meals/month



## Southern Branch of the Elizabeth River and its tidal tributaries

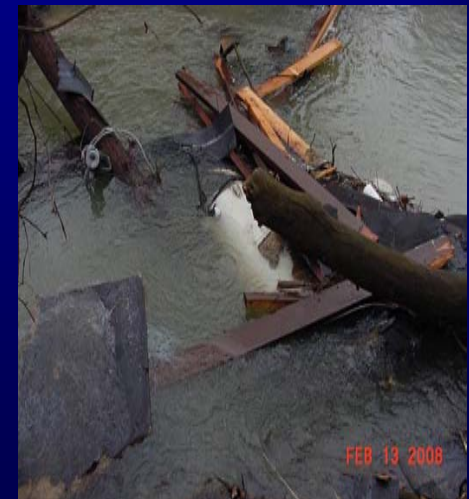
**DO NOT EAT** crab's hepatopancreas ("mustard," green gland, tomalley). Only applies to eating the "mustard". Crab meat is not subject to this advisory



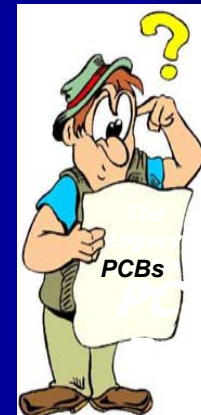


# PCBs

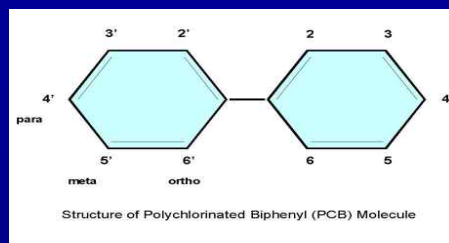
- Estimated that > 1.5 Billion lbs. manufactured in the U.S. until 1977 - “Legacy Contaminant”
- Very stable and heat resistant
  - Persistent in environment
- Common uses:
  - Transformers, capacitors, hydraulic fluids, circuit breakers, PVC Products, carbonless copy paper, caulking material, paints, etc.



# PCBs – What are They?



- Biphenyl molecule (1-10 chlorine atoms)

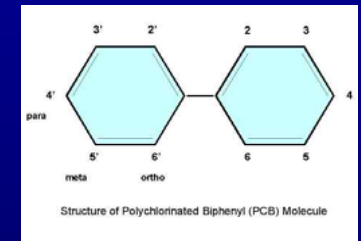


- 209 distinct PCB Compounds
- Regulated by VADEQ as Total PCB (tPCB)  
= 209 compounds summed
- Referred to as PCB Aroclors (Monsanto tradename) = mixture of PCB compounds

# PCBs – Why Important?

- Bioaccumulates at low conc. (lipids)
- Suspected carcinogen
- Other toxicological effects (humans)
  - Immunotoxicity, reproduction and developmental, hepatotoxicity (liver), neurotoxicity, and chloracne
- Major Sources of Exposure (humans)
  - Consumption of contaminated fish
  - Inhalation (dust from contaminated sites)

WQC =  
0.00064 ug/L





# PCBs - A Legacy Pollutant?

- Banned in late 70's
- Accumulate and persist in river sediments from historic releases
  - “Hot Spots”
- Generally not detected under VPDES Program



# PCBs – Current Releases?

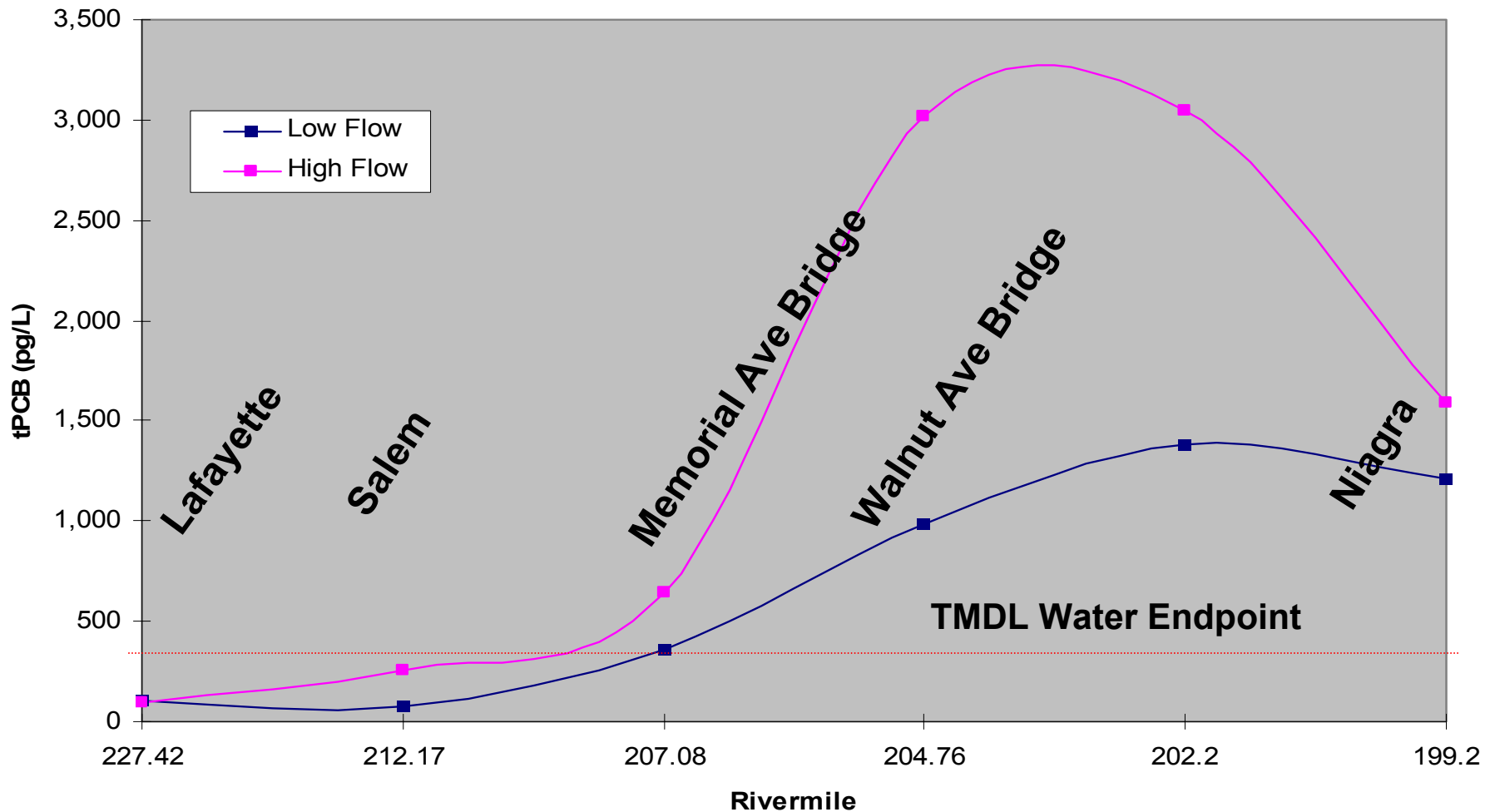
- PCBs used many years after banned
- Contaminated sites with active transport (non-point - e.g., CERCLA, RCRA, VRP, unknown)
- Point Sources
- Dielectric oils considered non PCB < 50 ppm
  - Fish advisories at 0.05 ppm
- Inadvertent production
  - Carbon + heat + chlorine
  - 50 ppm allowed (TSCA)
- Atmosphere



# Roanoke River tPCBs

## - Event Driven Releases -

Total PCB concentrations (pg/L) in ambient water collected from the upper Roanoke River during low and high flows



# Questions?





**Elizabeth River PCB  
Sampling  
Spring 2009**



# PCB Water Study

- Water & sediment samples collected April – June 2009
- Targeted wet and dry weather for ambient samples
- Used EPA Method 1668 for analysis
  - Low level detection method

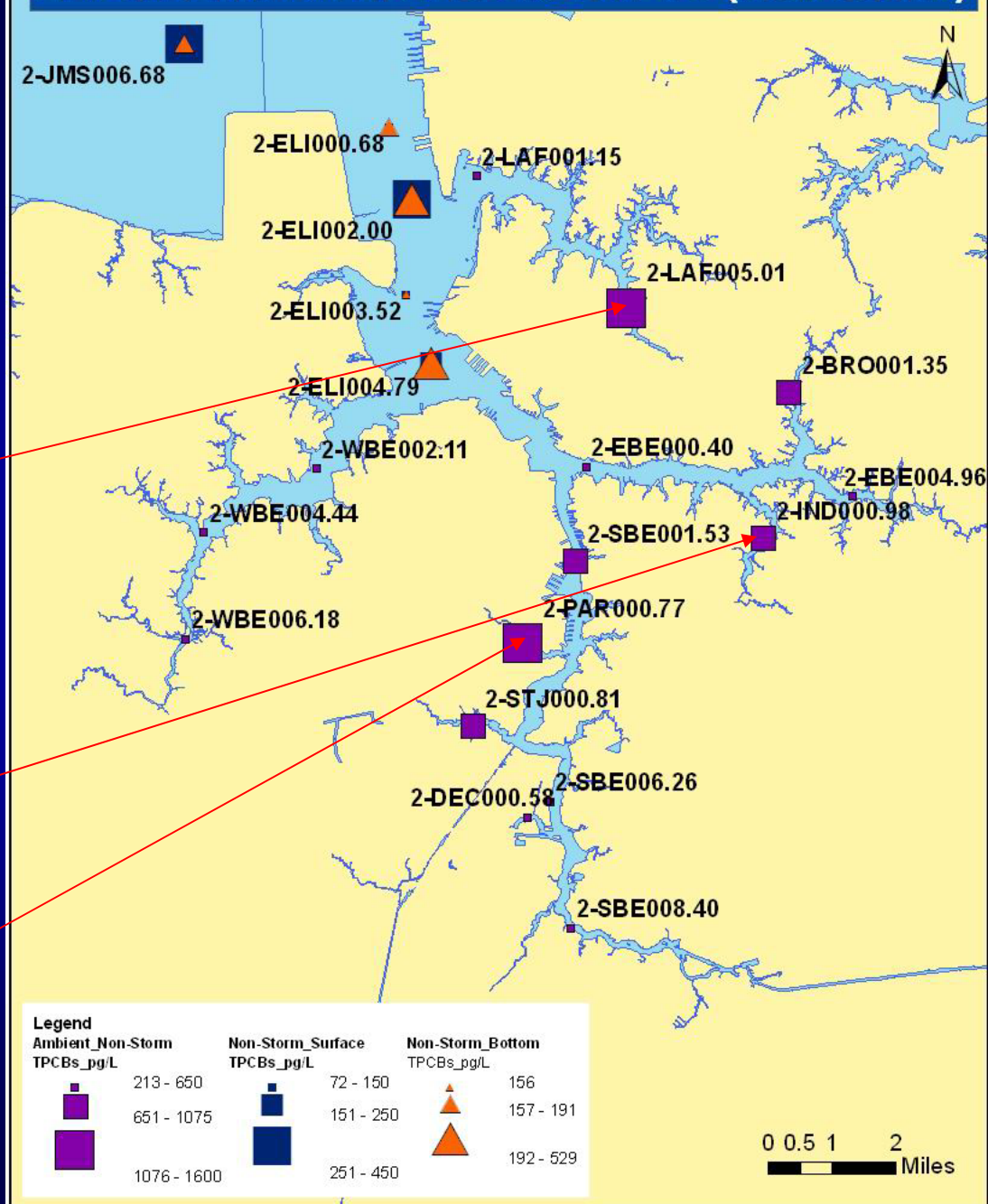


# Non-Storm Data

Section	Station ID	Total PCBs (pg/L)
Main Stem	2-JMS006.68	449 / 191
	2-ELI000.68	130 / 184
	2-ELI002.00	345 / 529
	2-ELI003.52	72 / 156
	2-ELI004.79	214 / 510
Lafayette	2-LAF001.15	213
	2-LAF005.01	1,507
Western Branch	2-WBE002.11	218
	2-WBE004.44	311
	2-WBE006.18	243
Eastern Branch	2-EBE000.40	396
	2-EBE004.96	464
	2-IND000.98	1,066
	2-BRO001.35	896
Southern Branch	2-SBE001.53	854
	2-PAR000.77	1,089
	2-STJ000.81	849
	2-SBE008.40	231
	2-SBE006.26	416
	2-DEC000.58	565

Proposed WQC = 640 pg/l

## ELIZABETH RIVER PCB RESULTS (Non-Storm)

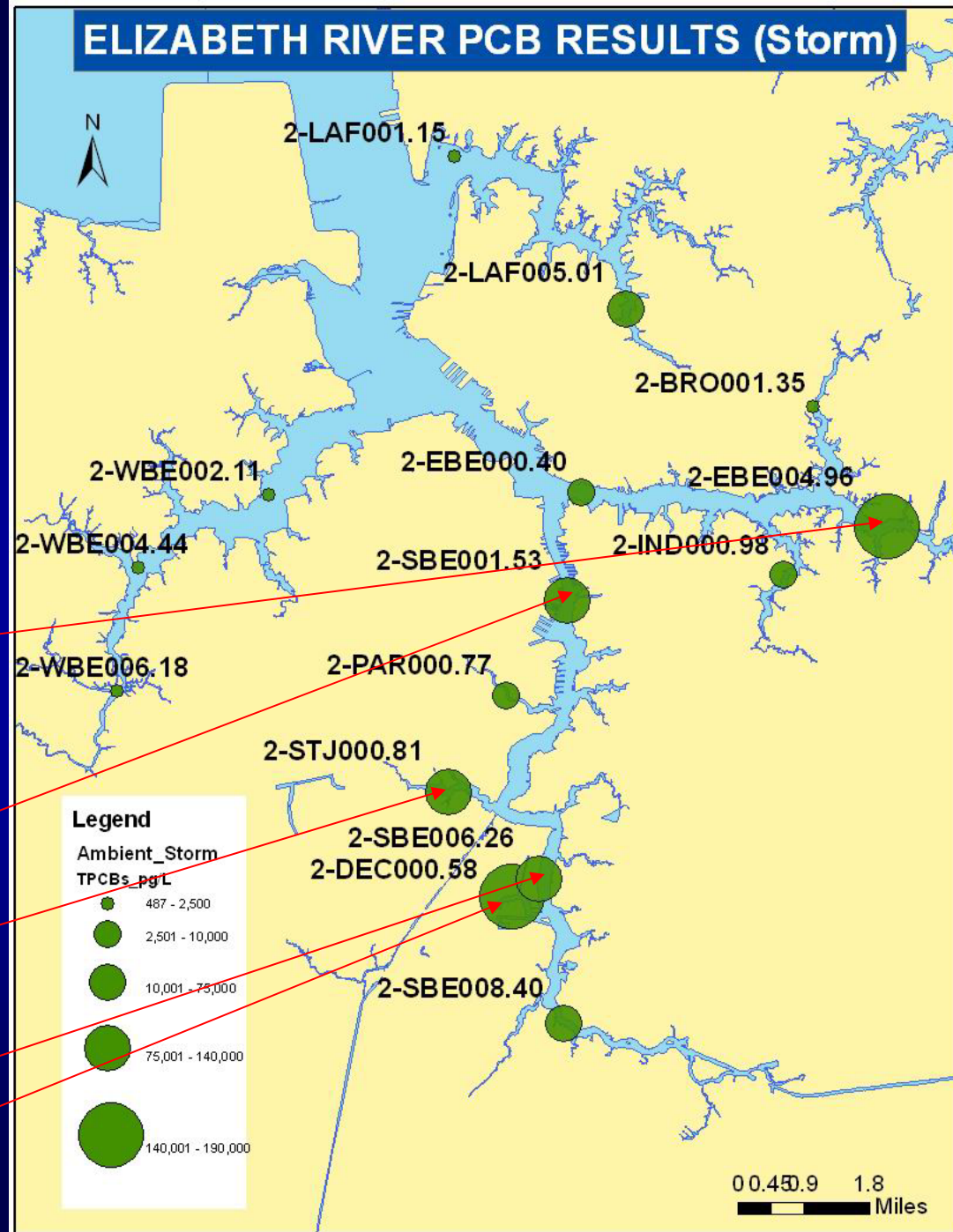




# Storm Event Data

Section	Station ID	Total PCBs (pg/L)
Lafayette	2-LAF001.15	487
	2-LAF005.01	73,417
Western Branch	2-WBE002.11	906
	2-WBE004.44	696
	2-WBE006.18	580
Eastern Branch	2-EBE000.40	99,974
	2-EBE004.96	187,542
	2-IND000.98	2,513
	2-BRO001.35	1,035
	2-SBE001.53	100,054
Southern Branch	2-SBE001.53	5,339
	2-STJ000.81	109,085
	2-SBE008.40	72,461
	2-SBE006.26	121,053
	2-DEC000.58	140,182
	2-DEC000.58	140,182

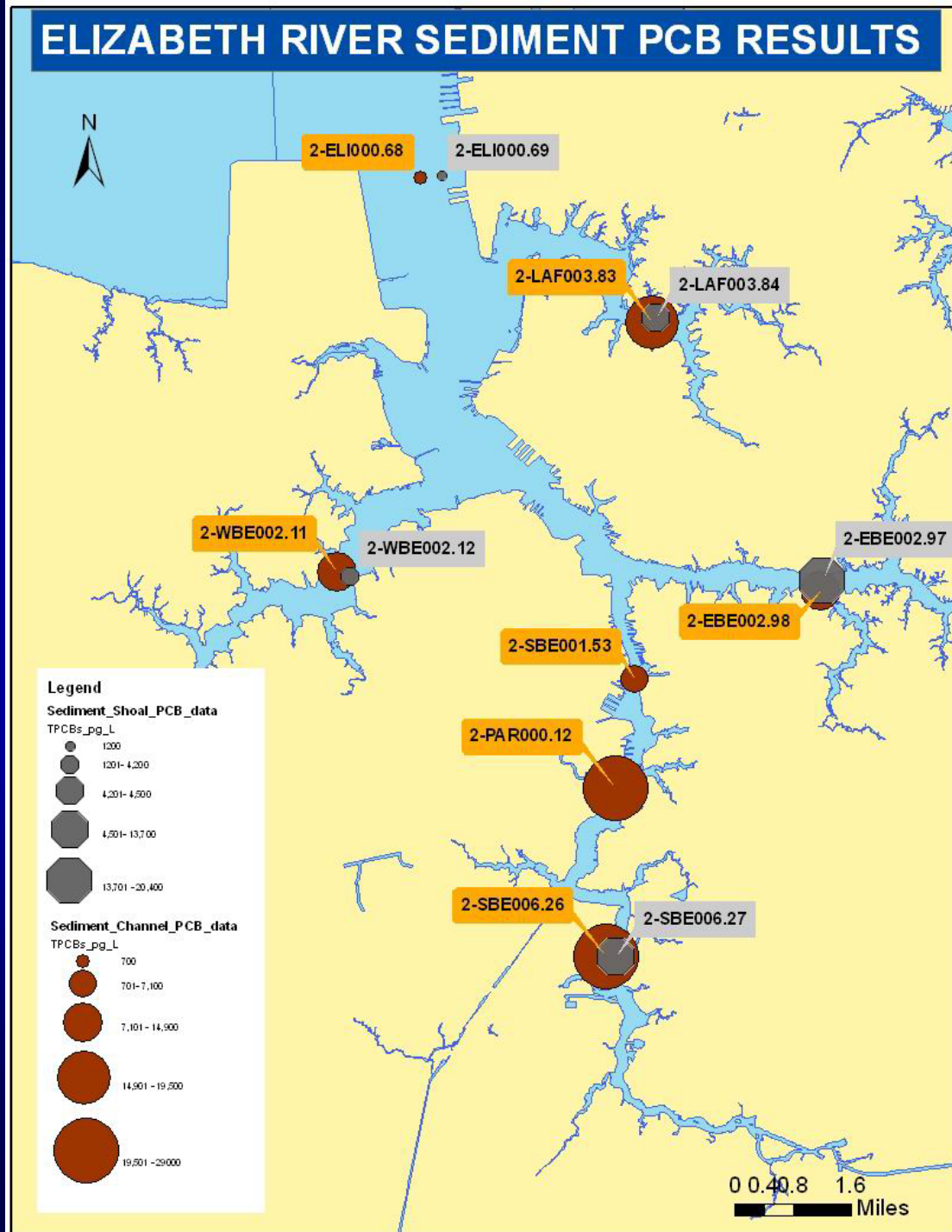
Proposed WQC = 640 pg/l



# Sediment Data

Section	Station ID	Total PCBs Channel/Shoal (pg/g)
MainStem	2-ELI000.68/69	715 / 1,183
Lafayette	2-LAF003.83/84	19,458 / 4,410
Western Branch	2-WBE002.11	14,869 / 4,137
Eastern Branch	2-EBE002.97/98	12,251 / 2,0397
Southern Branch	2-SBE001.53	7,069
	2-PAR00.12	28,257
	2-SBE006.26/27	28,902 / 13,618

**Samples collected in channels and shoals of each branch for purposes of modeling PCB fate and transport**



# Questions?



# Components of TMDL Study

Fish Consumption Advisory



Identify Problem

Initiating



Source Assessment

- Identify sources
- Estimate source loading

**Method 1668**  
Low Level PCB  
Analysis



Link Sources to Targets

- Assess linkages
- Estimate total loading capacity

TMDL Allocations

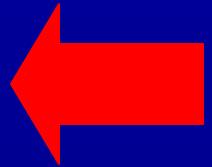
- Divide loads among sources

**TMDL = Sum of WLA + Sum of LA + MOS**

# TMDL Source Assessment

## - Load Categories-

- Point Sources
  - WWTPs, Industry, Industrial SW, CSOs
  - MS4
- Non-Regulated Stormwater (Direct Drainage)
- Contaminated Sites
- Atmospheric Deposition
- River Sediment



# Point Sources

- TMDL requirements:
  - Baseline or existing load condition
  - Waste Load Allocations (WLAs)

$$\text{Baseline PCB Condition (g/yr)} = \left[ \text{PCB conc. ng/L} \right] * \left[ \text{Ave Flow (mgd)} \right] * \text{Conv. Factor}$$

~~~~~

$$\text{TMDL WLA (g/yr)} = \left[ \text{PCB Endpoint conc. conc. ng/L} \right] * \left[ \text{Design Flow (mgd)} \right] * \text{Conv. Factor}$$

# Point Sources

- Permitted dischargers generate PCB data under the VPDES Permit Program using EPA Method 608
  - Typical Comment
    - “PCBs have never been detected in my effluent”
- Why are permitted dischargers being asked to collect additional PCB data?

# Point Sources

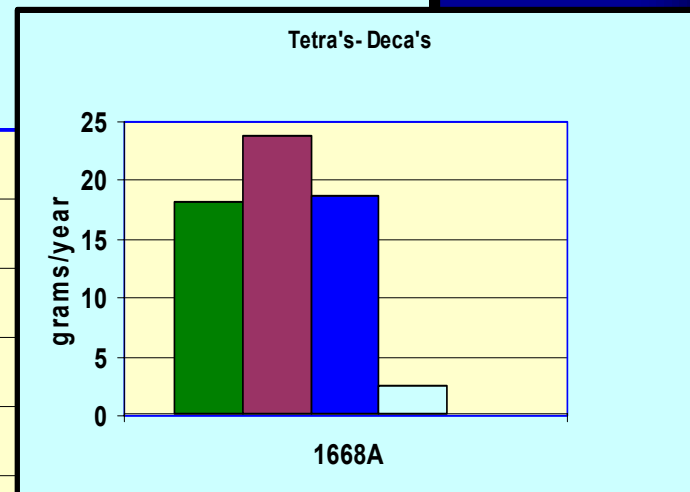
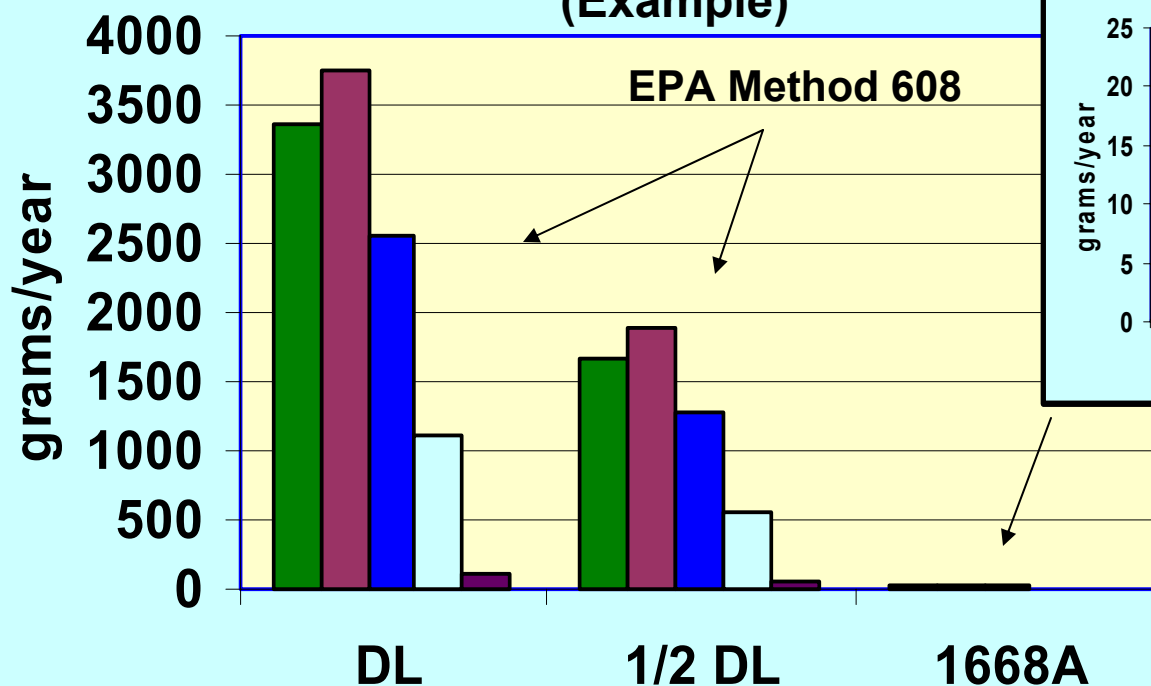
## TMDL Need - Establish Baseline Loading

- EPA Method 608 (Permit method)
  - PCBs rarely detected (MDL =  $0.065 \mu\text{g/L}$ ; QL =  $0.5 \mu\text{g/L}$ )    tPCB WQC =  $0.00064 \mu\text{g/L}$
  - Reported as Aroclors
- Options
  - No data = no load?
    - Not an option: existing load required by TMDL
  - Use assumptions (Method QL or DL)
  - Generate low level PCB data

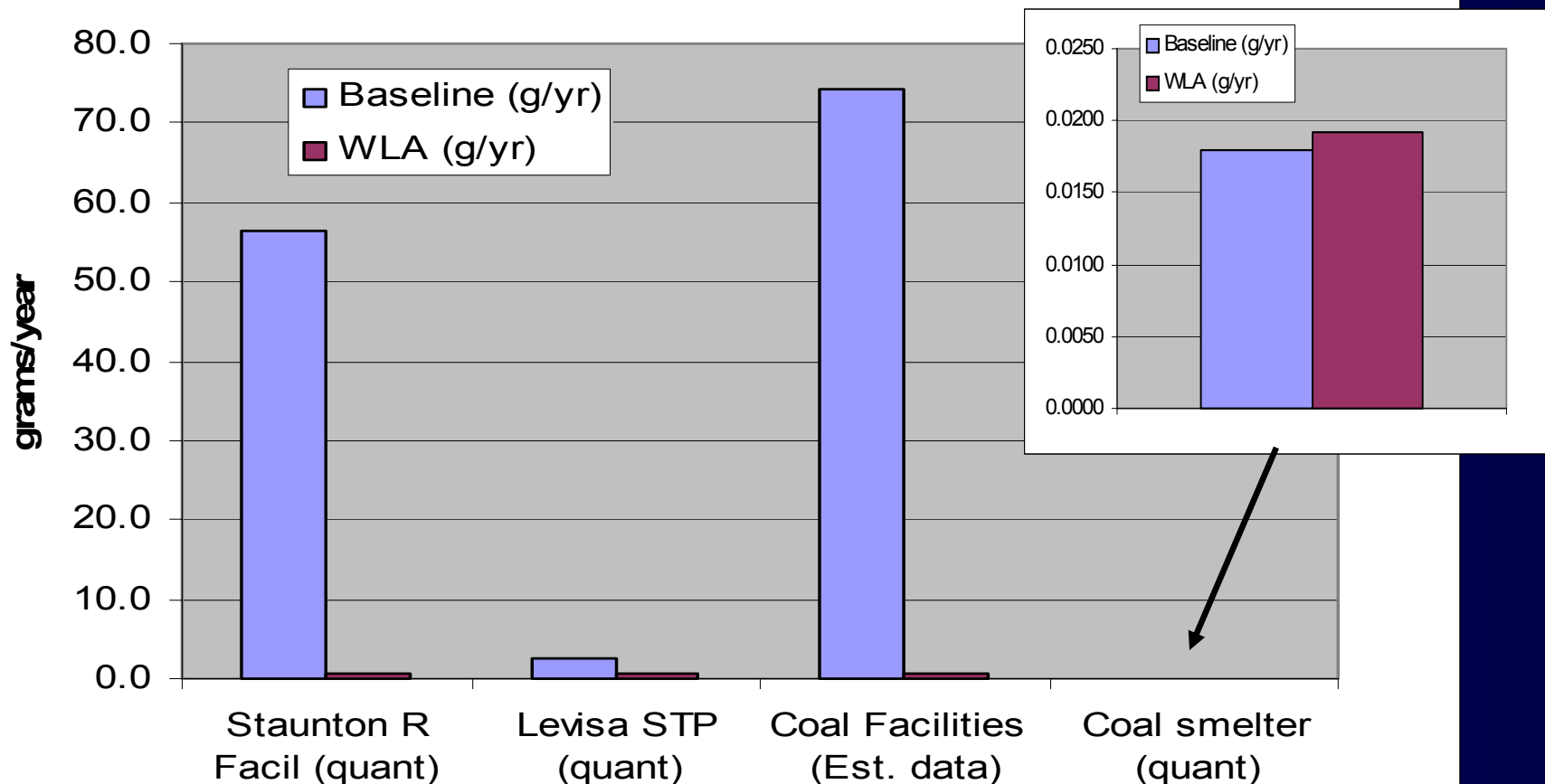


# Assumptions vs. Real Data

Projected PCB Loads from 5 major STPs on the  
Potomac River  
(Example)



## PCB Load Comparison Between Baseline Condition and the TMDL WLA



**Baseline PCB Condition = [PCB conc. ng/L] \* Ave Flow (mgd) \* 1.38**

**TMDL WLA = [PCB Endpoint conc. ng/L] \* Design Flow (mgd) \* 1.38**

# PCB Analytical Method

- EPA Method 1668, Revision B
  - High Resolution Gas Chromatography/  
High Resolution Mass Spec
  - Analyzes 209 Congeners
  - Detection  $\leq 5$  pg/L per congener
  - Targets PCB concentrations that are relevant to fish

# Questions?

# **Guidance for Monitoring of Point Sources for TMDL Development Using Low Level PCB Method 1668**

March 2009

<http://www.deq.virginia.gov/tmdl/pcb.html>



# Need for PCB Monitoring Guidance

- All areas of the Commonwealth lacking PCB water data (ambient and effluent)
- DEQ has insufficient funding to perform PCB analysis for TMDL source categories
- Asks permit holders to generate the data
  - Provides a consistent, technical approach
  - Enables DEQ to focus on performing ambient water and sediment PCB analysis
    - Used for source assessment
    - Model fate and transport of PCBs

# Point Source PCB Monitoring Guidance

Purpose is to establish procedures for implementing point source monitoring of PCBs in support of TMDL development.

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Originated from data needs on the Potomac PCB TMDL. Similar to efforts used in New York (Panero *et al.*, 2005), Delaware and New Jersey (DRBC 1998)

<http://www.nyas.org/programs/harbor.asp>

<http://www.state.nj.us/drbc/regs/pcb-new.pdf>

# Guidance Developmental History

2006 - DEQ Internal Development

2007 thru 2008 –

Technical Advisory Committee: Bluefield STP, City of Richmond, Dominion Resources, DCR, DMME, HRPDC, Navy, Southern Environmental Law Center, UOSA, U.S. Fish & Wildlife, VAWMA, VMA, Western VA Water Authority (6 meetings)

DEQ Internal Review (ongoing)

EPA Region III review (Fall 2008)

2009 - Finalized

# Guidance Document

- I. Introduction
- II. Background
- III. Authority
- IV. Definitions
- V. Procedure
  - A. Facilities identified for monitoring
  - B. Monitoring frequency
  - C. Sample collection and analytical requirements
  - D. Analytical laboratories
  - E. PCB reporting requirements
  - F. References
- VI. Appendices

# VADEQ RO Identifies Facilities Considered for PCB Monitoring (per Guidance)

- Major (including CSOs) & minor municipals
- Industrial facilities (specific SIC codes)
- Industrial stormwater dischargers under individual or general permits (SIC codes)
  - Exemptions (case by case basis)
    - Minor municipals – document not a source
    - SW through a POTW or CSO or “no exposure”
    - Representative or identical outfalls
    - DEQ does not regulate MS4s (DCR)
      - Provides framework for PCB monitoring

# Monitoring Frequency

Base flow (dry) and storm flow (wet) needed for load characterization

VPDES Facility				
Municipals		Industrials		
Major $\geq 1$ MGD	Minor < 1 MGD	Process wastewater only	Process wastewater with storm water	Storm water only
2 wet + 2 dry	1 wet + 1 dry	2 samples (storm event sampling not required)	1 dry + 1 wet	2 wet

# PCB Guidance Appendices

- Appendix C
  - Sampling options & “clean technique” protocol
- Appendix D
  - Analytical Requirements (EPA Method 1668)
  - **Approved list of laboratories on website**
- Appendix E
  - Data Submittal Requirements



# Approved Laboratories

- Lesson learned:
  - If analysis is not performed in accordance with requirements specified in Appendix D, not worth running the analysis
    - Reporting levels not met
- Cost containment
  - Opportunity for partnerships
    - Samples run in batches of 20
    - Samples can be held under the proper conditions up to one year.



Search DEQ

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Virginia DEQ :: TMDL :: PCB resources

Main Menu

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TMDL implementation

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Chesapeake Bay TMDL

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TMDL ad hoc committee

Additional information

DEQ water programs

Regulation

Public Notices

Guidance

Contacts

Email: [Charles Martin](#)

## Resources for PCB TMDLs



- [Guidance for Monitoring of Point Sources for TMDL Development Using Low-Level PCB Method 1668](#)
- The VDEQ issued a statewide strategy in January 2005 to address PCB contamination in the waters of the Commonwealth: [PCB Strategy Report](#)
- [PCB Laboratories](#)
- [Advisory Committee Meeting and PCB Guidance Materials](#)
- Electronic Deliverable Data (EDD) files available for download in accordance with the PBC Point Source

# Questions?

**Presentation & PCB Guidance Available  
at**

**<http://www.deq.virginia.gov/tmdl/pcb.html>**

**[Mark.richards@deq.virginia.gov](mailto:Mark.richards@deq.virginia.gov)**

# Extra Slides

# PCB TMDL Implementation

- If baseline PCB load exceeds the TMDL WLA:
  - BMP WQBELs (40 CFR 122.44(k))
    - Numeric effluent limits considered infeasible
    - EPA accepted approach on Potomac River PCB TMDL
  - Pollutant Minimization Plan
  - Adaptive Implementation
    - Objective to back-track source and not treat at end of pipe